AMERICAN SCIENCE

SINCE returning to India two and a half years ago I have had many opportunities of discussing American achievements in science, especially in the domain of biology and agriculture with several Indian men of science. Many of these men, who have been to Great Britain and Germany for advanced training, are connected with the universities, colleges, agricultural or scientific institutions. The opinion expressed by a majority of them relative to American scientific work was that much of it was "spurious," "no scientific value," "will have to be carefully repeated," "take with a ton of salt all that comes from the New World," etc. Having worked in or visited many of the best scientific institutions in the United States, I was not only surprised but pained to hear such disparaging remarks. When I have pressed these men to point out instances of spurious work or when I have brought under their notice some of the fine researches that have definitely advanced knowledge, I have found that the prejudice in several cases was not based on any facts. Indeed some of these men, when a new problem turns up for solution, especially in the field of the agricultural sciences, go to American literature for guidance, while some others are busy investigating problems which have long ago been successfully solved in America.

I think that much of the prejudice is because the people here can not realize the extent of facilities and funds available for scientific work in America. An American scientist, interested in a problem, works all day and far into the night. He subscribes liberally to journals in which he is interested and reads a great deal not only in his own but collateral sciences. He very frequently attends scientific association or academy meetings so as to meet and exchange thoughts with others working along similar lines. He is ever on the alert to advance in the subject of his choice, and on his achievements depends his future. In India things are different. Funds and facilities are meager. The scientist is appointed to hold a "permanent position," which he relinquishes only after he reaches a certain age. If he is in a particular "cadre" he gets his annual salary increment irrespective of meagerness of scientific output. Those in the lower rungs of service who may be doing well have few chances of advancement because of rules of service and various other causes.

Scientific societies are few and the annual meetings are not well attended unless the universities or the government departments meet the "traveling allowances" of these men of science. Personal subscriptions to science journals is a luxury indulged by very, very few, indeed.

A third reason for the belief that American science is cheap is, perhaps, the American generosity in distributing "literature." Some of the experiment stations and other institutions send their bulletins, memoirs, etc., for the mere asking. The spirit behind this, in several cases that I know of, is an honest desire to help and for the spread and dissemination of knowledge. This is mistaken here for American "boosting." Many of the distributed bulletins have only local value, such as those reporting varietal trials or manurial tests or, say, those reporting the trend of prices of hogs as correlated to corn yields. Some stations send not one or two but four or five of the same bulletins. No wonder files of these in library corners come to be known as American trash. It is only when a publication is extremely inaccessible or rare that its value advances. It is the duty of an investigator to search and find out literature, rather than for an experiment station to bring it to the notice of workers the world over.

It is time for the experiment stations to revise their free distribution policy, especially in these depression days, and help also in acquiring proper recognition for American science.

"TAXILA"

INDIA

SPECIAL CORRESPONDENCE

MALNUTRITION IN THE AMAZON BASIN

ONE of the very interesting observations made during the recent magnetic expedition, August, 1931, to January, 1933, in South America, by the writer for the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, concerns the distribution of malnutrition in the Amazon Basin. While this matter has nothing to do with the prime purpose of the expedition, attention is called to it, since it may be of great interest to organizations that are concerned with the study of human life and settlement in the tropics.

It has long been pointed out by Stefansson and a number of other Arctic men that the civilizing influence of missions and Hudson's Bay Company stations is not entirely beneficial to the Eskimo. The reason is that malnutrition and deficiency diseases, which seem never to be found among these people as long as they live by their own hunting mode of existence, generally make their appearance as soon as

the Eskimos begin to barter furs, etc., for the food supplies brought north by the white men. In this connection, Dr. William A. Thomas, working with the 1926 MacMillan expedition, made a health survey of the Eskimos of Greenland and Labrador. His report, published by the American Medical Association, states that those Eskimos who have close contact with traders, "whose meat is cooked and whose diet includes many prepared, dried, and canned articles," are very subject to both scurvy and rickets, while those Eskimos who live their native life of hunting and fishing, with a carnivorous diet, mainly raw, show no tendency toward either of these diseases.

A somewhat analogous condition was observed on this recent field-trip, but has never, as far as I am aware, been reported by any other observer.

In this memorandum, reference is entirely to the "white" settlers in the regions concerned, meaning by that the non-Indian inhabitants, who generally lead a life far different from that of their Indian neighbors.

The Alexander Hamilton Rice Expedition to the Rio Branco, 1924–25, made a medical survey of that region, and reported malnutrition, due to the lack of fresh food in the diet of the settlers, as being one of the greatest fundamental detriments to health. This was confirmed by the writer, as far as a non-medical observer may dare to confirm the reports of a medical expedition. I believe, however, that even a lay traveler is justified in linking the almost universal lethargy of the inhabitants of a region with his own lethargy and his own inability to obtain fresh food.

The same condition was seen on the Brazilian Rio Negro, where health conditions were bad, the white settlers nearly always obviously listless and whining, and where there was the greatest trouble in getting anything to eat except beans, rice, dried meat and dried fish.

One curious fact, however, was very noticeable. The Venezuelan-Brazilian border on the Rio Negro seemed to draw a sharp line of division between two "health regions." On the Venezuelan Rio Negro and on the Orinoco as far as Puerto Ayacucho, the settlers were evidently much more active and much more inclined to laugh and "get a kick out of life" than on the Brazilian side. At the same time, while I also had difficulty in getting food on the Orinoco and upper Rio Negro, it was almost impossible there to obtain any kind of dried or preserved food such as beans, rice or dried meat. The only articles obtainable that were not fresh were mandioca and cassava bread. Everything else was invariably fresh, such as corn, bananas, pineapples, live chickens, yucca and live turtles.

It seems reasonable, therefore, to conclude that the settlers on the Venezuelan side of the border owe their better health conditions to better nutrition, and the corresponding absence of deficiency diseases.

This condition can in no way, however, be ascribed to a difference in personal tastes between the Venezuelan and the Brazilian settlers. It must, I believe, be ascribed to the fact that the Brazilian government shows a greater amount of concern for its "out-of-the-way" regions than does the Venezuelan government for those in Venezuela.

The Venezuelan Orinoco and Rio Negro are entirely abandoned to-day as far as regular commercial transport is concerned. Commerce in these regions is dead, except for a small amount of balata and some few Tonka beans. The result is that most of the settlers here export nothing and can import nothing. Most of those who lived there a few years ago have emigrated by now, but the few remaining ones are forced to plant, hunt and fish in order to stay alive. Agriculture among the white settlers is far more prevalent to-day than it was in the days of the rubber boom and is a direct result of the withdrawal of "civilization."

On the Brazilian Rio Negro, however, there is at least one steamer or launch every month, between Manaos and the garrison-town of Cucuhy, on the border. This makes commerce possible, and most of the settlers on the river still engage in trade—in balata, Brazil nuts and palm fibers. They pay almost no attention to agriculture, getting the major part of their food from Manaos in dried and preserved form, since no ice is to be found anywhere on the river. The result is malnutrition.

In justice to the Brazilian government, however, it must be said that the seriousness of the situation is fully realized. A great deal of money has lately been spent at Barcellos, in clearing land for an enormous plantation, to be run in sections by the local inhabitants under government supervision. The ultimate success of this, however, depends on the price of rubber. If the latter rises a few cents, it is probable that the citizens of Barcellos will abandon their plantation and run into the jungles for rubber.

The sub-prefect of Barcellos, a medical student, recognizes the seriousness of malnutrition among his people. At the time of my visit he had applied to the government at Manaos for permission to import three live steers a month, to be butchered at Barcellos, so the inhabitants can have some fresh meat. I had some interesting discussions with him about this, since in my opinion the method was hardly adequate. The probable result of such a step would be that the people would obtain their precious meat, dry it and hoard it for Sunday use. However, the importation of foods by the government would hardly tend to stabilize the population. It would have seemed much

better to import a number of the Indian water-buffalo that do so well in the jungle regions of the lower Amazon, and get the inhabitants to breed the animals themselves.

However, any such step would have to be accompanied by education in the desirability of fresh meat against dried. It is noticeable that on the ranches of the great fertile cattle plains of Brazilian Guiana, where over 200,000 head of cattle are grazing to-day, fresh meat is almost unobtainable, and the problem of malnutrition is every bit as serious as on the jungle rivers. Vegetables seem never to be planted. Meat is very seldom eaten fresh. The reasons for the latter are threefold. In the first place, the ranchers are used to dried meat and possibly prefer it to fresh. Their diet is extremely limited in scope. This would probably make it all the more difficult to induce them to change and enlarge it—Stefansson has very forcibly pointed out that men as well as dogs who are used to a limited diet find it much more difficult to take to any change than those who are already used to a great variety. In the second place, the absence of ice makes it impossible to preserve meat in a fresh state after a steer has been killed, and would result in a large amount of wastage unless the meat were dried. In the third place, the population in these regions is so scattered that any "community" solution of the problem would be impossible. Every ranch is a small and self-contained community in itself, and the butcher-shops that are found in the town of Boa Vista can not exist in the cattle plains.

The river turtles and fish that give the inhabitants of the river settlements a certain amount of fresh food in units small enough to prevent wastage are, of course, lacking on the cattle plains. Whether or not chickens are cultivated in the cattle lands to any extent is something I am not able to say. On the two ranches that I visited, they were not to be found.

One other matter, that may be of interest in connection with the problem of diet and dental caries, might well be mentioned here. In Manaos I met Mr. Desmond Holdridge, of the Brooklyn Museum, who had with him a Makuxi Indian boy called Moi-i. This boy had lived for some fifteen years with his tribe, living the usual native tribal life. Here he had never known or seen any signs of dental decay. He had found it necessary, however, at the age of fifteen, to leave his tribe and to establish himself as a hired hand on the Brazilian National Ranch in the cattle plains. After a year and a half there, he came to Manaos with Holdridge, where the latter found it necessary to take him to the dentist to repair the ravages of a bad case of caries. This was told to me by Moi-i, and confirmed by Holdridge, who had known the boy well when he first left his tribe.

Inquring about the changes of diet, etc., that had accompanied this change in dental health, I found the following to have taken place. While living with his own people, Moi-i had eaten a great many fresh vegetables of various kinds, a good deal of hard cassava bread, little meat and almost no salt. On the ranch, living with white men, he had eaten a great deal of meat, mainly dried and salted, also milk, cheese, etc., almost no vegetables and a great deal of salt. The point about salt is interesting in view of the fact that the Indians of Southern Venezuela seem to believe that the white men have bad teeth because they eat so much salt. Moreover, while living with his own people, Moi-i had had the habit of constantly cleaning his teeth with charcoal, a habit that he had dropped when he went to live with the white man.

The matter throws an interesting light on the widespread modern idea that our teeth are bad because our soft foods do not give them enough exercise. While with his own people, Moi-i had found plenty of exercise for his teeth, in chewing the hard cassava bread. Here they stayed healthy. But later, when he lived with the white man, he had to chew still harder in order to get down the quantities of dried meat. If exercise is the determining factor, his teeth should have improved instead of deteriorating.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SAVINGS IN LABORATORY EXPENDITURES WITHOUT LOSS OF EFFICIENCY

WITH the present decreases in budgetary appropriations it has become a necessity for investigators to secure results with cheaper equipment. Notable savings can be accomplished by simple adaptations of common marketable supplies which are used for domestic purposes.

Operating tables for animal work can be readily adapted from kitchenware departments at a cost which is one tenth of the fancy professional models. Operating lamps, 110 volt, (particularly of the large Zeiss or Leitz types) can be equipped with 100 watt Mazda, instead of the costly filament types, without great loss of efficiency. Six volt lighting equipment can readily be modified to take automobile lamps, sometimes at an increased efficiency and generally at one tenth of the cost.

Sterilization can be secured just as readily with a